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PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

FEBRUARY, 1926

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THIS is an appeal for the names of those concerns who could profitably advertise in PLASTICS. It is prompted by two very interesting, but to the publishers also disturbing incidents.

The other day a company manufacturing a coating that can be used by all manufacturers of pyroxylin novelties and most casein articles telephoned our office—"We just saw a copy of your magazine," said they, "and want to advertise in it. Our advertisement must start in the January issue."

When told that it was too late and that the January issue was off the press they felt badly that they had not heard of the magazine sooner.

Another firm, a manufacturer of flexible hose for hydraulic presses, two days later called us, "We heard about PLASTICS from one of your advertisers. Had a hard time finding you", was the message, "Please send a man to take our advertising."

These two plaintive messages caused us to wonder, and sadly too, how many other firms there are who should advertise in this magazine? Due to the demands of a busy office there are doubtless many we don't know of and who never heard of PLASTICS.

You, who read this, can do this paper a service by sending us the names of such concerns. In turn you will be helping the industry by putting its mouthpiece, PLASTICS, on a firmer, sounder basis.

We need not tell you that any business periodical lives and grows and gives to its industry in proportion to its advertising revenue.

So do all of us a good deed; put on your thinking cap and send us half a dozen names today.

The Publishers.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 2 February, 1926 No. 2

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The Structure of Casein Plastics

Lack of uniformity is controlling factor in adapting this material to its various uses

By K. Haupt and M. Waechter

From Kunststoffe, 1925, 15, 129-131

BY far the greater amount of casein plastics are made by the well-known process of kneading slightly moistened casein and then forming the same into rods, plates and tubes. Following this, the material is subjected to a sort of tanning action with formaldehyde.

Simple as this may seem, it is, in actual practice, extremely difficult to obtain a truly homogeneous product. As a result of this lack of uniformity, the pyroxylin plastics have up to the present time maintained their superiority to the casein plastics.

Some manufacturers, however, have considerably improved their products in recent years and the same make, in general, is quite uniform as compared with other products from the same plant, although it may differ considerable in its properties from the casein plastics of another manufacturer.

In order to test casein plastics for smoothness and homogeneity it has been found possible to employ optical methods. Thus far only rods have been critically examined in this way, and the results obtained show some very interesting conditions as to the internal stresses in casein plastics.

If a rod of imitation horn made from casein, as for example a material known in the trade as "blonde" horn, be cut transversely into discs about 1 to 2 millimeters in thickness, and then examined under plane polarized light, it will be found that the discs are double refracting in many places. In every case there will be seen concentric rings of interference colors, together with a central cross which corresponds to the planes of polarization of the Nicol prism. The general appearance is quite similar to that shown by a sphero-crystal.

One of the difficulties that confronts manufacturers of casein plastics is the proneness of the material to check and craze.

Proper care in preparation and seasoning will do much to overcome the defect and the optical method proposed by the authors should be of considerable assistance.

A specific example, in the case of rods from 5 to 8 millimeters thick, gave the following results, as shown in figure 1. The central portion of the disc is isotropic, and the indication of grade from yellow at the edges is negative. The colors exhibit grade from yellow at the adges to a red. Rods of heavier material do not show so decided a pattern.

On rods 115 millimeters thick, and from the same manufacturer, the pattern shown in figure II was quite characteristic. In this case the central portion is not isotropic, but positively double refracting, whereas the outer zones in thinner rods are negatively double refracting. Both parts are separated by a concentric neutral zone. The difference in color tone in the central part is gray to slightly yellowish, the other portions ranging from yellow to red.

The different makes of casein plastics differed considerably from each other whereas material from source A, even up to a diameter of 20 millimeters, still showed the same general pattern, from yellow to red; while another make, B, viewed in the same thickness of disc

and beginning from rods 16 millimeters thick, showed green at edges instead of red or yellow.

A little plate cut from a rod by successive parallel cuts running longitudinally to the rod, when viewed in polarized light, exhibited the same interference colors, only this time they appeared as streaks instead of circles. Their general appearance is illustrated by figure III.

The middle of the strip is negatively double refracting in relation to the central axis. The parts near the edge are positively double refracting, and considerably more so than the negative central portion. The edges are separated from the core by a well defined neutral stripe running parallel to edges.

In strict accordance with these observations it appears that casein plastic rods really possess the nature of a series of concentric cylinders or tubes and which exhibit considerable internal stresses. These concentric layers of material under varying strains, as evidenced by the wavelength of the interference colors, makes it possible to determine the uniformity and general qualities of the products of different manufacturers.

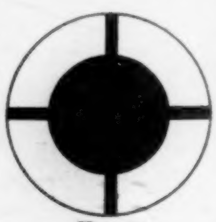


Fig I

At the same time they allow of an explanation of the peculiar behavior of these casein plastics and the difficulties encountered when fabricating the same into commercial articles.

It is a well known fact that many casein plastics are subject to the extremely highly undesirable effects of splitting and crazing with time. In the case of rods two quite different forms of cracking and disintegration can be noticed.

Fig II

The rods either split in an irregular manner, the cracks appearing over the entire rod, all

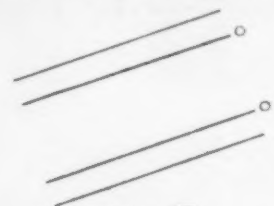


Fig III

being however of the same depth, so that it becomes quite evident that what is happening is a gradual shattering of the outer skin or cylinder of material which is under a different tensional strain than the deeper portions of the rod. The other form of crack generally occurs as longitudinal split which becomes deeper and goes into the second layer, and then continues until a distinct cleavage line between the outer and inner shells develops, the crack then continuing in a more or less curved line.

Cause of Splitting

As the second layer begins to split up, further separations take place, so that such a split cylinder when cut straight across would have the appearance of spiral cracks running from the outside toward the center. Of course such breaking down of casein plastic rods is much more noticeable with thick rods than with thin ones.

One of the main objects of the casein manufacturer is to keep his material as uniform and homogeneous as possible, in order to prevent just such occurrences. Extreme care is necessary and should begin right at the start—the making of the plastic mass from which the rods are extruded or otherwise formed.

It has been clearly demonstrated by experiments that if properly blended casein is first extruded into rods that the sections of the resulting plastic rod do not show an isotropism under plane-polarized light and no signs of double refraction. This condition can actually be realized with modern mixing and molding apparatus.

However, although initially quite uniform and free from stresses, such casein rods when allowed to lie in the open air for a few hours, will, when cut into discs, begin to show signs of double refraction, appearing about like in figure IV. This condition is undoubtedly due to shrinkage due to drying. One obvious remedy is either to use as little water as possible in making up the plastic casein mass, or, alternatively, to lay the rod into water as soon as it comes from the press.

Very much more serious than the stresses caused by drying, are those set up as a result of the action of the formaldehyde in the hardening bath. As this process, depending upon the individual manufacturer and also the nature of the product may take from several weeks to months, considerable differences are bound to occur in these materials.

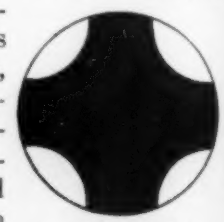


Fig IV

A rod 15 millimeters in diameter, and which has lain for two days in the formaldehyde hardening bath, showed the same kind of double refraction as shown in figure II. This is easily understood when it is remembered that this rod had already absorbed formaldehyde solution and had swollen, whereas in the other case shrinkage had taken place.

After a total of eight days in the formaldehyde bath, the same material exhibited the general appearance of figure V, that is a negatively refracting edge (a little wider than in figure IV), then toward the center, a concentric neutral zone,

Figs. I to V illustrate the appearance of the casein plastics under polarized light and show the structure to vary.

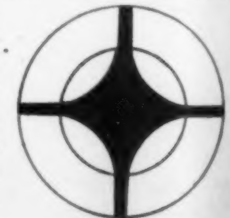


Fig V

(*Continued on page 58*)

Plastic Molding Made the Phonograph Possible

Edison's and Berliner's inventions only became popular when means for duplicating were perfected

By Carl Marx

THE history of man's attempt to reduce and re-create the human voice apparently dates back to antiquity. It has been stated on good authority that there is recorded in an ancient Chinese tome the fact that over two thousand years ago a Chinese prince had evolved a mechanism in a box into which he spoke, and which was then taken to a brother prince in another state, who was able to hear the actual words spoken into this contrivance.

Barring this almost legendary example, and the comparatively crude attempts of Thomas Young in 1807, the first authenticated attempts to record the human voice in permanent form were those made by Leon Scott in 1856, who invented an apparatus which he termed the "Phonautograph". This machine was the prototype of the phonograph developed twenty years later by Thomas A. Edison. This, the first practical talking-machine, was further developed by Edison during 1877 to 1888, but employed a cylindrical record of the same type which has maintained its popularity in the form of the present-day Dictaphone which is so extensively used in business offices throughout the world.

These early efforts however, although they produced audible responses which fairly accurately stimulated the sounds impressed upon them, did not provide any means for duplicating the records, and thus make possible the wide dissemination of the speaker's or singer's voice. The first method of reproducing the early wax records was to actually play a master record into another recorder, or else to have the artist make as many original records as were desired. Obviously no such methods would provide the vast quantity of records required by the public when once the interest in the invention had been aroused.

Methods of duplicating the wax cylinder records were eventually worked out, and the method of molding such cylinder records, known as "gold molding" made their manufacture on a fairly large scale possible during the early part of the present century.

The fragility of the cylinder record, and also their unwieldy bulk made a search for a more convenient form necessary. While Edison was working away at his particular form of phonograph, others were busy as well. In 1885 Alexander Graham Bell, of telephone fame, and S. Tainter patented a talking machine which they called the Graphophone,but it remained for Emile Berliner to devise the first successful flat or disc record.

Emile Berliner in 1888 worked out the details of the method that made it possible to engrave

Thomas A. Edison with his original phonograph.

a spiral groove in a flat disc and also showed how a sound record could be etched into a metal surface. These were radical and

The Phonautograph of 1856.

new steps and marked a distinct advance in the art. Berliner himself has so graphically described his early work, and incidently the making of the first molded disc records, that his statements in his lecture delivered before the Franklin Institute at Philadelphia, on May 21, 1913 bear repetition. He said:

Berliner's Gramophone

"It was 25 years ago last week that I gave here the first public exhibition of the gramophone. On that evening, May 16, 1888, I showed in this auditorium how a voice could be etched into metal. * * These disc records, the first of their kind, were reproduced in a machine turned by hand, and all of them were originals. One duplicate was shown and reproduced and this had been made by electrotyping an original sound etching in the same manner as an etched halftone is electrotyped.

"In 1888 the tinfoil phonograph of Edison had been known for 10 years, and the wax cylinder phonograph or graphophone of Chichester Bell and Summer Tainter had been invented. I pointed out at the time that the horizontal record was better capable of recording the sound in its entirety while in the vertical record certain distortions took place which became more pronounced the deeper the sound waves indented or engraved the record substance.

"When I returned to Washington, D. C., I set to work trying to develop a duplicating process which would enable me to make a number of records of the same selection in hard, wear-resisting material like celluloid or hard-rubber.

The first successful duplicate so produced was made for me in the same year (i. e. 1888) in celluloid by John Wesley Hyatt, well-known as one of the inventors of celluloid, and this duplicate is still in existence at the National Museum at Washington, D. C., being the first sound record duplicate in hard material which was made by pressing a reverse of the original record into a hard material while the latter was softened by heat. and then chilling while still under pressure. This process is at the bottom of the present industry of making millions of sound record copies annually."

Emil Berliner

Berliner soon found that the celluloid disc records were not hard enough, and then tried to make hard rubber records. After considerable effort some of these were turned out in 1895 but proved to be far from satisfactory. At this juncture Berliner fortunately remembered some experiences which he had at the laboratories of the Bell Telephone Co. back in 1879 when small parts were molded from a plastic composition containing shellac as a binder. This proved to be the ideal material and before long the technique of molding shellac-base phonograph records was under full development. Berliner, moreover, is able to trace back the development of the shellac record to 1887, as he says:

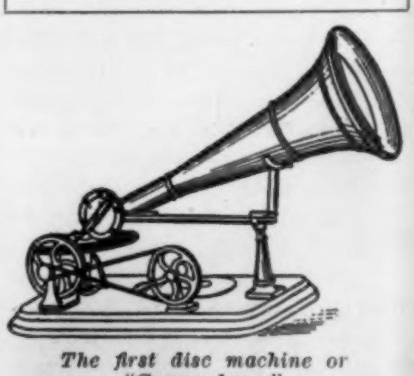
The First Molded Record

"As early as 1887 I tried to make records by pressing a matrix into sealing wax," and that, of course, is a shellac plastic composition.

The ideal composition for molding a phonograph record must be one that is sufficiently plastic to give an absolutely true copy of the matrix,be sufficiently hard to withstand playing for a great number of times, and yet soft enough to prevent undue wear on the reproducing needle, for if this becomes blunt before the end of the record were reached, the sound would be blurred and "fuzzy." Although countless attempts have been made since Berliner's first shellac records to find something better, by far the greater bulk of modern sound records are still made from this material—and it is safe to say will continue to be made this way for many years.

Other developments followed the lines of decreasing the weight of the records, making the same unbreakable, and many efforts have been made to perfect a record which contains a fibrous or flexible core with a plastic composition on the face of it.

The modern development of the phonograph record and the manufacture of the same by the large producers will be taken up in an early issue.



The first disc machine or "Gramophone."

With the Pioneers—II

Alexander Parkes and Parkesene

Pioneer work of this versatile inventor laid the groundwork for others' success

By Julia Greenfield

GUNCOTTON had scarcely been invented; the hectic discussions as to its merits and discovery were still resounding and burning veritable holes into the paper of a large number of publications. The first patent on the product had just been issued, when Alexander Parkes, one of the most prolific inventors of his time and country became acquainted with the material thru his friend J. Taylor, who, as it chanced, was also intimately acquainted with Christian Schoenbein, who had given this important cellulose product to the world.

Parkes soon found ways and means of producing the necessary guncotton and began a long series of experiments, which at first were quite devoid of success. Spurred on however by the tantalizing possibilities of the material, which he could visualize, but not attain, Parkes kept at it until, in 1855 he had succeeded to a point where a patent could be granted upon the product which he had at last produced from this remarkable material.

Viewed from modern times, it is really remarkable how well Parkes succeeded in producing a plastic mass from guncotton. Although he made many mistakes, notably one of using oils to impart plasticity, he did make a large number of articles which time has shown can be made with perfect success from the basic material cellulose nitrate.

Parkes was severely handicapped by the almost total lack of solvent materials, the only solvents available in those early days being an impure form of methyl alcohol, call wood-naptha and ethyl alcohol and ether.

It was from solutions of guncotton in ether and alcohol that Parkes made his first attempts at forming solid masses. The great inflammability of the material proved another serious and almost insurmountable handicap, but Parkes was undaunted and kept up his efforts for almost twenty years.

The rise of the modern pyroxylin plastic industry dates from 1855 when Alexander Parkes made the first crude attempts to utilize the recently discovered cellulose nitrate of Schoenbein. Although he failed commercially to produce a suitable product he showed the way to others.

Before discussing some of his achievements in greater detail, something regarding the personal history of this inventor must be told. Alexander Parkes was born at Birmingham, England, in 1813. When only fourteen years old, in 1827, he was apprenticed as a molder and designer at the art-metal works of Messenger & Co. at that city, but, having practically the run of the factory, soon became intensely interested in metallurgy.

This bent toward things metallic followed Parkes thruout his life, and with the exception of his twenty years efforts on nitrocellulose plastics, by far the greater number of his inventions were in the field of applied metallurgy and chemistry.

In 1840 he was engaged by the firm of Elkington as a superintendent of the casting department of their electroplating works, and took out his first patent in the following year.

Perhaps his claim to fame would have been assured if he had done nothing further than his invention of the process for desilverizing crude lead by the use of zinc, a process which has maintained itself to the present day, and is universally known by his name—the Parkes process.

Another field in which he was quite active was in the drawing and welding of flat metal plates and in the processes for the production of "Seamless" or "Weldless" tubing.

However, his venture into the pyroxylin plastic field was not the only organic chemical problem that he attacked. Parkes is credited with the discovery of the use of carbon bisulfide as a rubber solvent, and as one of the major contributors to the art of vulcanizing oils the manufacture of the so-called "factices" or rubber substitues, made by acting upon vegetable oils with sulfur chloride. In 1846, the same year as the discovery of guncotton, he obtained a patent for the cold vulcanization of rubber by means of sulfur chloride. All this has an important bearing upon the work he later did with nitrocellulose. Parkes was busy in South Wales in 1849 building extensive copper works and did not return to active work on his pyroxylin plastics until 1862, when he began 5 years of intensive work on the subject, which

work was crowned with such success that even in the first of these years, he received a prize for his product, which he had named after himself, Parkesine, at the World Exposition in London.

A fair idea of the future that Parkes thought was ahead of his discovery can be gained by quoting from a lecture which he delivered before the London Society of Arts, on December 22, 1865. He said :

"For more than twenty years I have entertained the idea that a new material might be introduced into the arts and manufactures. I succeeded in producing a substance partaking in a large degree the properties of ivory, tortoise-shell, horn, hardwood, rubber, gutta-percha and the like.

"Parkesine is made from pyroxylin and oil, alone or in combination with other substances. The pyroxylin is made from cotton or flax waste."

The inflammability gave him considerable trouble, but he attempted to combat it by the introduction of fire-proofing agents as cadmium iodide, sodium tungstate, gelatine, zinc chloride, carbonates, sulfates and phosphates.

In this respect he was distinctly the pioneer, as many of these same materials have been again advocated in modern times for the same purpose. Parkes continues with his remarks to the effect that . . . . . .

Collodion

"After much research, labor and investigation, I observed that the solid residue left on evaporation of the solvent of photographic collodion produced a hard, horny, elastic and waterproof substance. This led me to employ this pyroxylin or xyloidine for my future operations. By the word pyroxylin I wish to be understood as meaning the less explosive preparation than the highly converted guncotton."

One of the real advances made by Parkes was his discovery of the possibility of dissolving pyroxylin without the necessity of drying the same. Some of his ideas along these lines are still the guiding principles in the modern art.

The most important and outstanding fact however is that it was Alexander Parkes who was the first to combine camphor and pyroxylin. Although it was later contended, and proven to the satisfaction of most observers, that he did not recognize the tremendous importance of camphor in these pyroxylin plastics, he nevertheless clearly pointed out that it was coupled with considerable advantage. In the course of this lecture he said, on this subject, that "another important improvement in the manufacture of Parkesine is the employment of camphor. This exercises an advantageous influence on the dissolved pyroxylin, and renders it possible to make sheets, etc., with great facility and more uniform tex-

(Continued on page 60)

Ethyl Cellulose for Plastic Products

Leon Lilienfeld extends utility of cellulose ethers

A NEW type of plastic material, which has some very valuable properties and very wide application, is the subject of United States Patent 1,563,204, issued November 24th, 1925, and applied for January 11th, 1921. The importance of the invention and its basic value is evidenced by the fact that the following foreign countries have already issued patents covering the same:

Austria 90,010, Aug. 1, 1919;
Germany 357,707, July 19, 1920;
England 149,319, May 14, 1920;
France 521,000, July 23, 1920;
Italy 210,536, July 31, 1920;
Sweden 54,449, July 30, 1920;
Norway 37,755, July 23, 1920;
Denmark 29,621, Aug. 19, 1920.

The present invention is based on the observation that the alkyl, or the aralkyl-derivatives of carbohydrates having the empirical formula n $(C_6H_{10}O_5)$, such as cellulose, starch, dextrin, etc., or their conversion products or derivatives when mixed with certain oily liquids give products which can be used for many technical purposes.

The oils in question can be conveniently made by treating high-boiling coal tar oils, i. e. any coal tar hydrocarbons having boiling points above 140°C and especially those boiling between 140°C and 220°C, with acetylene in the presence of aluminum chloride (0.5 to 10% of the latter, based on the amount of the tar oil being treated) and distilling the reaction mixture, with or without a previous removal or decomposition of the aluminum chloride compound.

The oils thus obtained have a blue fluorescence and the fractions boiling in vacuo (for example at a pressure of 20 millimeters) between 85°C and about 260°C are especially suitable for the purpose.

(Continued on page 60)

The Romance of Amber

From the depths of the storm-tossed sea nature disgorges long-hidden fossil resin

By Irving L. Goldberg
Vice-Pres., American Celutex Corporation

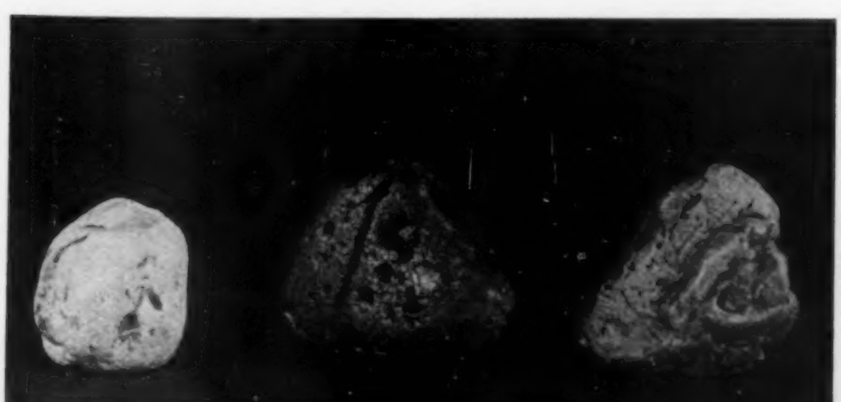
OF all the many precious and semi precious minerals which have been imitated in the plastic arts, Amber undoubtedly stands at the head of the list in popularity, and it might be interesting to review briefly some of the facts relating to it not generally known.

Its record goes back many centuries and we have it on good authority that it was highly prized by the successor to the caveman who sought to substitute it for his club in winning the effections of his lady friends. Frequent reference to it is found in the early histories of the Hebrews, Persians and Greeks. Jewelry of Amber has been discovered in Mycenaean tombs, in Denmark and among Anglo-Saxon relics in England, so that it would seem that its mellow beauty was universally appreciated in the early days of our civilization in widely separated areas. Today it still enjoys the same popular favor but its use is decidedly limited, being confined principally to beads, bracelets, earrings, crucifixes, jewel boxes and smokers' articles.

This restricted use is due mainly to the fact that solid pieces, free from fissures or cracks, cannot be secured large enough to form more massive articles, such as brushes, mirrors, etc., and here we have a very pointed illustration of how an imitation can be put to better use than the real thing because in plastic compounds we have unlimited applications for amber effects which are not possible in the genuine.

Clear Amber Rare

The golden-yellow Amber now enjoying such a vogue in toiletware is found only rarely in the natural mineral, the usual run being of a mottled effect, partly translucent. This cloudiness is due to air bubbles which, however, can be eliminated by subjecting the finished articles to an oil bath which has the effect of filling in the pores and thus producing the clear color. Amber, however, is not by any means limited to this yellowish shade but is also found in various parts of the world in bluish, reddish and purplish tints, each locality having its own peculiar shade, but the greatest demand is for yellow with which its names has universally been associated.



Raw Amber mined at the shores of the Adriatic.

Amber, the mineral, as nature has handed it down to us, was in its original state a resin excruded by certain species of pine trees. Through the prehistoric ages, these trees with the resin deposit adhering to them were swallowed up by successive strata of earth and rock deposited by the action of the elements, and after being subjected to tremendous pressure, with its accompanying heat, this resin became petrified and took on the characteristics by which we know Amber today.

The greatest Amber producing area is Samland in East Prussia, where it is mined extensively and it is also collected in that same general locality along the shores of the Baltic and North Seas. It is gathered in these latter places by searchers who make this their regular occupation. The theory is that the amber globules are torn from the ocean bed and washed on to the beach. The collectors look for it attached to seaweed which they rake up in shallow waters and some of the larger operators have even resorted to the use of divers, who gather the seaweed together at greater distances from the shore. The largest yield, however, is from the mines which are worked systematically, as before noted, in underground galleries.

The British possession of Burma is the next largest source of supply after East Prussia. In this far-off colony, large deposits have been located and are being actively mined. Sicily, also, has its Amber mines which have been worked for centuries. The Sicilian product is of a peculiar purple tint that is highly regard-

(*Continued on page 58*)

Patented Method of Substituting Thin Sheet Stock for Solid Pyroxylin

WHILE considerable discussion has recently been taking place about the desirability of standardizing on the thickness of pyroxylin plastic sheets employed for the making of toilet sets, especially mirrors and brush-backs, a recent patent assigned to the Standard Pyroxoloid Corporation deals with methods of using much thinner pyroxylin sheet material, and means for simulating the appearance of heavier stock.

While this is a step toward conservation of material, and the substitution of a cheap substance, it nevertheless, as claimed, produces an article which is equal in strength to that of one made throughout of plastic material of uniform properties. While this may be questioned by some of the fabricators of the higher grade type of novelties, the method employed is of considerable interest to all manufacturers of such goods.

The process consists essentially in forming the mirrors, brushes, etc., from pyroxylin sheets not over 40-1000 of an inch in thickness, and then filling the interior of the necessarily flexible material with a plastic substance which can harden and become sufficiently stiff to give the article its strength. Perhaps the best way to make the nature of the invention clear, is to quote from the patent, No. 1,565,354, issued to George R. Farrell on December 15, 1925, and assigned to the Standard Pyroxoloid Co. on an application filed November 15, 1923.

Reference is to be had to the accompany drawings, in which

Fig. 1 is a plan of a hand mirror constructed in accordance with this invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and

Fig. 3 is a view similar to Fig. 2 showing the application of this invention to a hair brush.

In Figs. 1 and 2, I have shown the invention as comprising a back 10 having a perimeter 11 extending all around it and incurved at edge. It extends upwardly from the plane back 10 to a slight distance and is provided with a flat top surface 12 extending all around in a plane parallel with the main surface of the back 10. The front 13 of this article is made in the same way and both these parts, instead of being formed as heretofore of a thick piece of pyroxylin, are formed of a thin sheet of pyroxylin preferably not over 40/1000 of an inch in thickness. The edges are made in dies smoothly convex so that they do not have to be trued up or finished. The front instead of having a flat outside surface like the back 10 is prvoided with a depression 14 for receiving the mirror 15 and

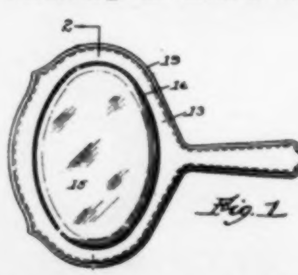
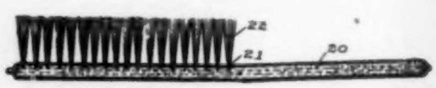


Fig. 1

a pyroxylin rod 16 for holding it in place.

It will be seen that if the two adjacent surfaces 12 of the front and back which are intended to be of exactly the same shape were abutted together they could be cemeted together and an article of the desired shape made therefrom. But to make a distinctive and attractive article and also to add to its strength and rigidity I place on one of these plane surfaces 12 a flat outline strip 19 of pyroxylin of considerable thickness but only of slight width. It has the outline of the article as shown and projects beyond the edges of the back and front 10 and 13 and also projects within them.

The parts thus far described constitute all the pyroxylin used and if put together in that way would provide a hollow article of very flexible character but I fill the space inside with a plastic material 20 capable of hardening to a condition in which it has a great deal of rigidity. This fills the entire space and gives the article the



appearance and strength of one made of solid pyroxylin. It will be understood of course that both the surfaces 12 of the back and front are cemeted to opposite sides of the strip 19. This strip is rounded off on its outer surface to give it an attractive appearance. As the convex edges of the front and back lie back a uniform distance from the edge of this strip 19 they do not interfere with the trimming and rounding of the outer edge of the strip 19. This article can be made by the method described in my copending Patent No. 1,521,875.

In the form shown in Fig. 3 the invention is illustrated as applied to a hair brush. This is made similar to the mirror but where that has a depression 14 for the glass, this is provided with a series of perforations 21 for a number of brush tufts 22. The ends o f these tufts stick back into thę interior of the article and are surrounded and held by the plastic material 20 which thus co-operate with the tufts to hold them in position. It also surrounds the inwardly projecting edge of the strip 19 to hold that rigidly.

The Fabrication of Dressing Combs

Further steps in the treatment of horn stock in making combs

By L. B. Kavanagh

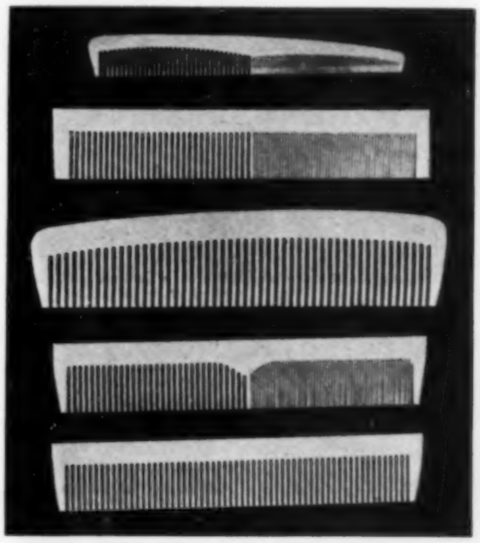
President, Standard Tool Co., Leominster, Mass.

[The fabrication of dressing combs was taken up in December *Plastics* and described up to the point where the teeth have been formed on the comb].

After the teeth have been cut or sawed in the combs the next process is that of reducing the sides of the comb near the points of the teeth on a beveling machine, which has an iron wheel to be covered by sandpaper against which the teeth on one side of the comb are forced and beveled or pointed, and after all have been run through on one side, the adjustable head of the rocker is readjusted and the combs run through again to bevel the other side in a similar way.

A comb is held with its back against the ledge in the adjustable head of the rocker by the tips of the fingers of one hand of the operator until the teeth of the comb first strike the sandpaper, while the other hand swings the rocker by the handle at the opposite end, the comb passing through and falling out underneath. The fingers should be withdrawn from the comb when it first strikes the sandpaper on the drum.

To Cover the Drum with Sandpaper. First, clean off any grease or old paper adhering to the drum. Hot water with soap and a sponge will help do it. Warm the Drum. This may be done by taking it together with the shaft out of the machine and heating it in a drying closet or with hot water applied by a sponge. Then coat the drum quickly with hot glue with a brush. Do not have the glue too thick. Have a piece of sandpaper ready of a size a little wider and longer than necessary to cover it, and apply it quickly and smoothly to the entire surface, pressing it against the drum firmly with the hands as you wind it round, so there will be no air space underneath. Then with a straight edge and knife cut through both thicknesses of sandpaper straight across the face of the drum, so as to trim a little, say ¼ inch, off the end of the sandpaper next to the drum. Pull off this narrow strip underneath. Put on a little more glue on that place, and then press down the end of sandpaper into place so as to butt the ends together and cover the drum perfectly. Let it dry and glue set thorouhgly before trimming sandpaper from ends of drum, or using the machine.

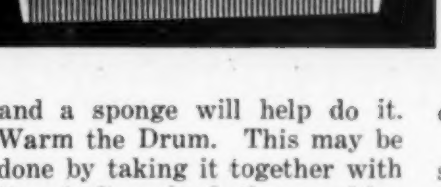


The covering of the drum should be done quickly and it is better to have an assistant.

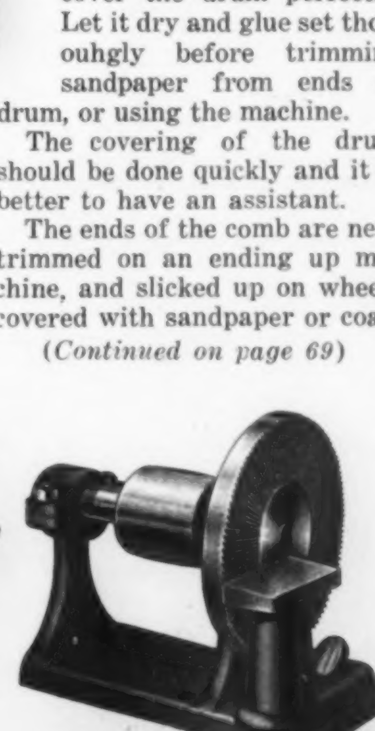
The ends of the comb are next trimmed on an ending up machine, and slicked up on wheels covered with sandpaper or coat-

(*Continued on page 69*)

Tooth-beveling Machine.



Bottoming-Burring Machine.



"Ending Up" Machine.

These machines are used in the fabrication of horn combs.

EDITORIAL · IMPRESSIONS

Keep a' goin'

NOW that the usual post-holiday period of quiet is settling down upon the many industries allied with the numerous plastic materials, there is given an opportunity for the use of the imagination in thinking up new uses for old products, or new products to fill older wants.

He who is ahead of the other fellow on original ideas, is usual- the one who follows along the lines suggested by a time-worn advertisement that once forced itself upon our attention at every cross-roads—"they work while you sleep." So while some of the less ambitious are taking their mid-winter siesta, it behooves the rest of us to get busy and prepare for the new business that is sure to come.

Never in the history of our country have we had more reason for genuine optimism, not the Pollyanna kind, but the kind that spurs a man on to achievement by the knowledge that there is no unforeseen disaster waiting for him 'round the corner, and that all he has to do to get on is to hustle and trust in his own capabilities.

His Master's Voice

ON the evening of New Years Day thousands throughout the United States were thrilled by the golden voices of a world renowned tenor, McCormack and Mme. Bori the equally famous operatic soprano, issuing from their radio instruments. Whoever missed it, missed a treat. When once the last note had died away, no earthly power could bring it back unless the singer could be induced to repeat his performance.

The necessarily evanescent character of radio performance makes it a certainty that the phonograph will endure as long as music plays a part in human happiness—for by this means only is it given to us to re-enact the matchless performances of the world's artists at will, and in our own homes.

In this realm, too, the art of the plastic molder has played an extremely important part, for it is by virtue of the thermoplastic properties of shellac that the miracle of voice re-creation became possible. In the series of articles on the development of the phonographic recording art, beginning in the present issue, the importance of the part that plastic materials play in the mass-production of permanent sound-records will be shown. Other industries that likewise either contribute to the art of producing molded goods, or depend largely upon them, will be taken up in the future.

Plastics and Motors

Again the great halls of the Grand Central Palace at New York are resounding with the noise of the multitude as it squirms, shuffles and elbows its way from one motor-car exhibit to the other, intently, more or less, absorbing the latest improvements and "new wrinkles" that are attendent upon the development and refinement of the modern gasoline chariot.

In years gone by, the yearly car-models differed much more widely from each other, but at present the tendency is rather toward improvements in appearance and greater convenience. Now, you may ask, what has all this to do with Plastics?

More than is commonly believed. The modern car has a great many parts made from such materials:—Bakelite balls for the tops of gearshift levers, phenol-resin handles on cigar lighters, the ubiquitous high-tension distributor, the very "brains" of the ignition system, innumerable switches, frames for the interior lights, molded handles both inside and outside the doors, the silent and almost unbreakable phenol-resin-fibre gears in the timing mechanism, the vulcanized fibre in the lamp-sockets and for insulation under diverse nuts, and in some cases even the frames for the instruments and perhaps even the instrument board.

The production of molded steering wheels has become a fine art, even the lowest-priced car having a plastic wheel made from reclaimed rubber.

Battery cases are now molded from one piece of plastic material, and the covers are likewise pressed out while hot. Horn and dimmer pushbuttons comprise shellac, hardrubber, and casein materials. The cellulose derivatives are represented by the windows in back and side curtains, and in some cases even the windshields themselves are made from pyroxylin plastics. With practically no exceptions, the cars are upholstered with artifical leather—again a pyroxylin product, and to crown it all, almost all of the machines are resplendent in their silky "Duco" finish pyroxylin lacquers.

Can any one doubt that plastic materials are an essential to almost every modern industrial product?

Terms

ONE of the questions that disturbs the even flow of the pyroxylin plastic industry is that of terms and dating of invoices.

It is a form of competition that is particularly liable to be used for practices that are, to say the least, questionable.

Standardization of practice in this regard, with terms not over sixty days, would help much.

The Cambridge

The Silhouette Cable

Spectacle frames made of plastic materials occupy an important position today in the optical industry. Is this position being strengthened or destroyed by present manufacturing tendencies?

Quality the Aim in Spectacle Frames

Price consideration should be secondary when dealing with the priceless heritage of sight

By David R. Ettinger
Vice-Pres., Optical Products Corporation

The manufacturing of spectacle frames from pyroxylin materials has enjoyed a remarkable growth within the past five years and spectacle frames, eyeglasses and oxfords of this type occupy an important position today in the optical industry.

It is interesting to note that the present demand for spectacle frames made of plastic materials has been created by the public and not the dealer. No intensive advertising drive has ever been made to tell Mr. Consumer of the superior features of this type of spectacle frame. He has recognized the economy, comfort, lightness and swagger of "imitation tortoise shell" frames and has demanded them from his dealer. This is, indeed a healthy condition.

Today, riding on the wave of this popularity for their product, the manufacturers of this type of spectacle frame face a true crisis. Has he the foresight to strengthen his position or, in his scramble for volume production, will he destroy it?

Imitation tortoise shell spectacle frames made of plastic materials are exceedingly reasonable in price considering the service they perform. They not only last longer than most frames but they also protect the wearer against lense breakage. But in view of the fact that the manufacturers of metal frames and kindred types have had many more years of manufacturing experience the spectacle frame made of plastic material does not enjoy the mechanical refinements nor, in some instances, the optical correctness of the aforementioned type.

Quality Paramount

In producing spectacle frames the plastic manufacturer should bear in mind that he is catering to a profession which cares for two of the most priceless organs of the human anatomy—the eyes. In optics, as in medicine, quality is and always will be the paramount issue—not price. In point of service rendered to the wearer imitation tortoise shell frames already enjoy plenty of price advantage over competitive products. The crying need therefore, would seem to be for an increasingly finer and more optically correct product; a product which would convince the oculists, optometrists and opticians of America that when they wish to choose a frame which will hold their patient's lenses in perfect alignment, will fit the contour of their patient's nose with absolute precision and will retain its adjustment satisfactorily—that the finest product they can purchase is a spectacle frame made of pyroxylin materials.

Not "How Cheap" but "How Good" should be the manufacturing creed of the plastic spectacle industry. Merchandise "Built Up To A Standard, Not Down To A Price" should be the sales slogan for 1926. Technical knowledge of optics must and will be applied to the manufacturing of spectacle frames from plastic materials if that industry is to survive the technical prestige of its competitors. Distinctive color combinations, cleverly constructed comfort cable temples, hinges embodying rigidity and adjustment, the Cambridge type of frame with the bridge at the top eliminating bridge pressure—these and many more innovations have attracted the attention of the optical world.

The Structure of Casein Plastics

(*Continued from page 46*)

and thereupon a clearly differentiated inner positively double refracting portion and again a neutral central core.

This condition forces the assumption that the hardening process had caused a swelling of the outer portions and an actual shrinkage of the inner portions. This seems at first sight as highly contradictory and paradoxical. The hardening process, as is well known, causes either a gain or a loss in weight of the material treated, the gain being the greater as the bath is weaker in formaldehyde. The particular material subject to examination when subjected to a 10% formaldehyde bath showed no gain in weight, and a stronger solution an actual loss in weight, increasing with the concentration.

The Hardening Bath

The action of the hardening bath can thus be explained as follows. As it gradually penetrates the plastic mass it first causes a swelling to take place. Then as it gradually seeps deeper, the concentration of the formaldehyde in the interior portions of the mass will increase, this being in strict accordance with the laws of absorption, and, as a result of this, the central portions will be deprived of water and hence attempt to shrink.

After twenty days in the hardening bath, which is usually considered to represent the average length of the hardening process, the rod section will show the appearance, under polarized light, as in figure II., being especially characterized by the neutral central zone. The range of interference colors are also about the same.

On exceeding the usual hardening period, the central portions remain unaltered, but the color of the edges begins to approach red in tint. This shows that the hardening period, if unduly prolonged, not only does not further indurate the material but actually causes unnecessary swelling to take place, thus aggravating the conditions of unequal internal stresses, and making the product less satisfactory in every way.

Thinner rods, such as about 6 millimeters in diameter, act in about the same manner. Of course all the above named actions take place much more rapidly in thinner material and are in consequence thereof much more difficult to follow.

Similar conditions arise on the final drying of the casein plastics. Therefore extreme care must be exercised to prevent undue strains from developing during the drying period, the main object being to have the drying take place slowly enough to allow the outer portions to shrink at about the same rate as the inner ones.

Actual tests show that a cross section of a commercialy dry casein plastic shows the same characteristics (see figure II) as a similar sized rod right after taking the same from the hardening bath. (Compare fig. V).

Uniform Product Possible

The questions as to whether it is at all possible to make casein plastics with sufficient homogeneity and which will approach the pyroxylin plastics as to uniformity and lack of internal strains, it can be stated that with our present knowledge this can be answered in the affirmative. Modern macerating and mixing machinery makes it possible to assure uniformity at least at that stage of the manufacturing process.

The Main Problem

The main problem that requires solution is the hardening process, as it has been shown that the stresses set up by the selective tanning action of the formaldehyde in the various concentric layers of casein plastic rods can not afterwards be corrected for.

It is hoped that the optical methods of examination described above will contribute toward a solution of this problem.

The Romance of Amber

(*Continued from page 51*)

ed in some countries where it is considered superior to the yellowish mineral. Amber has also been found from time to time along the English, Dutch and Danish coasts but the yield has been so small and uncertain that the exploitation of it has not been made a commercial success. It is also interesting to us in America to learn that Amber deposits have been found in New Jersey, but the quality is inferior and of no monetary value. It exists in Canada to some limited extent and there are reports of fairly large deposits in Mexico but not much is known regarding the quantity and quality of the mineral there.

The fabrication of genuine Amber has not assumed any large proportions in this country. The principal world center is Vienna, although there are numerous factories distributed throughout Germany and a few in France. The inferior grades of Amber, together with the shavings which fall off during the process of fabrication, are ground up and made into a lacquer by mixing with certain oils and stabilizers. There is also a factory in Germany which utilizes this waste by pressing it into solid pieces called Ambrasit, using linseed oil as a binder, and after the pressing and seasoning operations have been completed the blocks are then worked into articles in the same way as the genuine mineral.

Modern Plastics
By A. Hutin
See the March issue

Red and Black No Trade Mark

According to a decision rendered by Judge Winslow in the U. S. District Court of the Southern District of New York, in litigation between the Parker Pen Co. and Marx Finstone, doing business as the Eclipse Pen Co., the Parker Pen Co., does not have any exclusive right to a trade mark consisting simply in making their pens with a red body portion with two black ends, and that such color combinations were old in the trade.

The decision points out among other things that the mere adoption of a trade mark does not establish its validity, nor that a mark which is common to the trade when it is sought to adopt it as a trade-mark cannot become a valid trade-mark, Also that as the size of fountain pens was a matter of utility and function, and was in common use, it, with color combinations, does not entitle anyone to protection as against unfair competition.

The decision was rendered July 24th, 1925, and published Nov. 26, 1925, in Federal Reporter, Second Series, Vol. 7, p. 753.

Misbranding Shellac Substitutes

The Ohio Shellac Co. has been ordered to discontinue the use of the names "Dutch Main Shellac" and "Ohio Shellac" for their products, as constituting a case of misbranding. This is in accordance with an action taken by the Federal Trade Commission which is to the effect that shellac substitutes must not bear deceptive names which might lead the purchaser to believe that he is obtaining shellac.

Educating the Sales Clerk

By Leroy A. Steele of the Dupont-Viscoloid Co.,

in March Plastics

Alexander Parkes and Parkesine

(*Continued from page 50*)

ture, as it controls the contractile properties of the dissolved pyroxylin. Camphor is used in varying proportions, according to the requirements, from two to twenty percent. (Modern celluloid contains about 25%). Moreover, the material can be molded by pressure and the most beautiful works of art can be copied. Pigments and sawdust up to sixty percent can be introduced, and not only cheapen, but strengthen the product."

That Parkes saw the universal applicability of the material is clear as he recommended it for "spinner's rolls, pressing rolls, knife handles, combs, brush backs, shoe-soles, floor cloths, whips, walking stick, umbrella and parasol handles, buttons, brooches, buckles, pierced and inlaid-work, book-binding, tubes, chemical taps and pipes, photographic baths, battery cells, philosophical instruments, water-proof fabrics, sheets for surgical purposes, and for works of art in general."

Another use to which he put his material was for the coating or insulating of telegraph wires, and he made many tests of the insulating power of parkesine, which was found to be superior to rubber.

Why Parkesine Failed

Somewhere about 1867 Parkes succeeded in interesting sufficient capital to start a factory and a large amount of Parkesine was turned out,, and exhibited in Paris in 1868. However, due to the fact that he had grossly underestimated the cost of production, and in his zeal to get the material on the market neglected to properly prepare the material, most of it was returned to the works as it had warped and twisted hopelessly out of shape.

The main reason for Parkes failure to make his product a permanent success, was his use of oils. He invariably used large quantities of castor oil, sulfurized (vulcanized oils) and other entirely incompatible materials with his pyroxylin. It is doubtful if he would ever have overcome the difficulty—but that is now impossible to say as Parkes reluctantly gave up his efforts in 1867 and returned to his metallurgical work.

However, Parkes' work had an exceedingly important bearing upon the success of J. W. Hyatt in the United States courts when assailed by another English inventor, Daniel Spill, (about whom more will be said in a later article), as to the invention of celluloid.

Spill had won over Hyatt, when it was discovered that Parkes had been the one that showed the use of alcohol and camphor in making this material, and as a result Spill lost his case and his patents were reclared void for lack of invention.

Alexander Parkes died on Sunday, June 29, 1890, at his residence, Penrhyn Villa, Rosendale Road, West Dulwich, England. He was of a very modest and retiring nature and never advertised himself, a fact which contributed much to his being known to but of few of his contemporaries. It is significant that no photograph of this inventor ever appeared in any of the public prints of his day.

A Real Pioneer

Although it can hardly be said that Parkes discovered what is now known as celluloid, and as in all fairness to Hyatt it must be recorded that Hyatt was entirely unaware of Parkes work until at least 1869, he nevertheless was the first one to recognize in cellulose nitrate the wonderful possibilities that have made this product the base for so many useful and beautiful objects.

Ethyl Cellulose for Plastics

(*Continued from page 50*)

The fractions of tar oil boiling above 140°C which have been found particularly advantageous are the higher boiling fractions of solvent naphtha, or hydrocarbons which can be isolated therefrom. According to the relative proportions of the constituents in the mixture, masses are obtained which are either so soft and resilient that they can be used as a substitute for rubber, gutta-percha, balata, glycerin-glue and the like, or plastic masses which are of the nature of celluloid or horn.

Mixtures of alkyl or aralkyl derivatives of carbohydrates such as cellulose, starch, dextrin and the like, that is to say ethers of the poly-saccharides, with the aforesaid oils are adapted for use in the production of the following technical products: artificial leather, films, photographic articles or coating of any kind, lacquers, varnishes, paints, electrical insulating material, dressing for fabrics, leather, paper and the like, sizing materials for textiles, coating materials of any kind, printing materials or thickening for fixing means (vehicles) for pigments, artificial threads and textile fibers, artificial hair, adhesives, cements, sizes for paper and many more.

For carrying the process into effect alkyl or aralykyl ethers of cellulose, starch and the like, as for instance ethyl cellulose or benzyl cellulose which are insoluble in water but soluble in organic solvents, such as benzene, a mixture of benzene and alcohol, carbon tetrachloride, chloroform, a mixture of chloroform and alcohol, acetone, a mixture of acetone and alcohol and the like, mixed with the oils al-

ready described are worked up in known ways so as to make the above products.

Other cellulose derivatives such as cellulose nitrate, cellulose acetate or other cellulose esters together with the usual softening agents or plasticizers as camphor, phenyl or cresyl phosphates, and various oils can be added or incorporated with the mixtures.

As a specific illustration of the method of carrying out the invention, the patent describes the manufacture of a material similar to the well-known pyroxylin plastic. For example:

25 to 50 kilograms of one of the oils, such as that made by reacting on the higher boiling fractions of solvent naptha with acetylene in the presence of aluminum chloride, are mixed with 75 to 120 kilograms of a water-insoluble ethyl cellulose or benzyl cellulose, or ethyl starch or benzyl starch, optionally together with a solvent for the cellulose ether, and are then treated in the usual manner for the manufacture of a plastic material analogous to celluloid.

The manufacture of such widely different materials as artificial leather and insulating materials for cables are also described.

The claims, of which there are twenty-one, broadly cover the fundamental idea of incorporating the newly-discovered oil products with the cellulose or other carbohydrate ethers.

—o—

Glass objects can be coated, according to Ullrich Hagans, of Bremen, Germany, by dipping the same in solutions of colored pyroxylin plastic materials. The effect produced is very beautiful and at the same time the glass articles become almost unbreakable.

Daniel Spill
vs.
The Celluloid Co.

**A page from history—
in Plastics for March**

TECHNICAL ABSTRACTS

AND PATENT REVIEW

PHENOL RESIN GEARS. Louis T. Frederick, assignor to Fibroc Insulation Co., U. S. Patent 1,564,774, Dec. 8, 1925.

One of the commonest methods for making fibre gears is to take fibre in the form of a woven fabric, as for example, cotton duck, saturate it in a phenolic condensation product, place layers of the saturated fabric in a pile and then place in a hot press until hardened, subsequently cutting the teeth in the gears.

Such teeth, which are finding very extensive use in the automobile trade, for timers and where essential noiselessness is desired, require lubrication as there is considerable friction between the teeth. This lubrication is rendered practically superflous by the present invention, which consists in adding about five per cent of graphite to the resin solution or varnish which is used to impregnate the fabric before molding the gear blanks. This also material reduces the wear on the cutting tools which work up the blanks into gears. Suitable propertions are said to be: 50% fibrous material, 45% phenol resin and 5% graphite.

WATERPROOF HEAT-INSULATING COMPOSITION. Junius H. Stone, U. S. Patent 1,564,797, Dec. 8, 1925.

A waterproof plastic composition which can either be molded or applied to pipes, especially refrigerator pipes, while in the plastic form, and which will be waterproof and not return to the plastic state when wet, consists 24 parts granulated cork, four parts of loose fibre, such as cow's hair and one to four parts of rubber dissolved in a solvent such as benzene. It is mainly intended as a heat-insulating medium for pipes and tanks at lower than atmospheric temperatures.

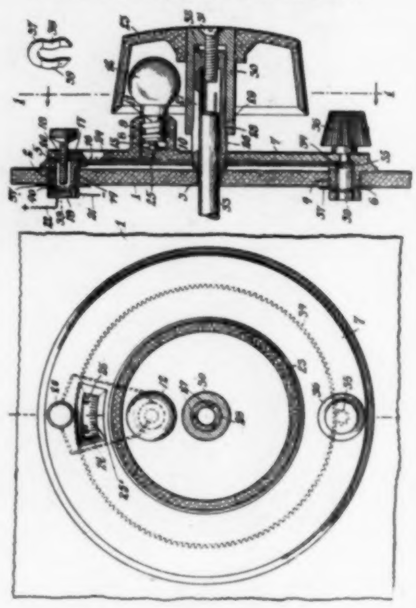
INK FOR PRINTING ON SHELLACED AND VARNISHED OBJECTS. Charles L. Cunningham, U. S. Patent 1,562,544, Nov. 2, 1925. Application filed August 14, 1924.

One of the objects of this invention is to provide an ink which will penetrate and merge with coatings of shellac varnish, paint and the like so as to be proof against erosion and will withstand the action of acids, alkalies or other chemicals which remove ordinary surface-inks.

To prepare the new ink, two parts of absolute alcohol, one part of diethyl phthalate, seventeen parts of ethyl lactate or ethyl oxalate, and any suitable coloring matter are incorporated.

This ink may also be employed as a dye or stain. for lacquered surfaces.

ILLUMINATED RADIO DIAL. William and Frank Buchholz, U. S. Patent 1,566,069, Dec. 15, 1925.



By making the knob of a molded composition product dial of sufficient size and by properly placing a minature incandescent lamp beneath it, illumination is provided for the "window" in the dial. The whole arrangement is somewhat analogous to a dash-light on an automobile.

WATER-PROOF INFUSIBLE RESINS. Canadian Electro Products Co., English Patent 227216, 1923.

Fibrous material such as wood fiber or wood flour, cotton flock, comminuted jute or leather scrap, or asbestos, are intimately mixed with a resin made from phenol and acetylene, and then mixed with a hardening agent such as an aldehyde, hexamethylenetetramine or phenylenediamine. The material is molded by the use of heat and pressure.

NONFLAMMABLE CELLULOSE PLASTIC. William Godson Lindsay, English Patent 230663.

When cellulose nitrate is employed as the base material, the filler consists of calcium sulfate and the plasticizer or triphenyl phosphate or similar phenolic material.

SHELLAC RECOVERY FROM PLASTIC MATERIAL. C. Harris, W. Nagel and Siemens & Halske A.-G. German Patent 413739, 1923.

The material is treated with a solvent for the shellac, a small amount of a mineral acid being added to facilitate separation.

SWITCH-BOARD PANELS; IMITATION SLATE; MATTE FINISH. William R. Whitney, assignor to General Electric Co. U. S. Patent 1,566,241, Dec. 15, 1925.

The present invention relates to the manufacture of articles, such as imitation slate switch-board panels and similar insulating devices, and which contain a relatively large amount of inert filler, and a heavy hydrocarbon compound as a binder or plastic mass the preferred material being asphalt or bitumen. As such panels when made with magnesia, Portland cement, and asphalt usually have a shiny surface, and as a matte surface presents a muc neater appearance, the completed composition after shaping is treated with strong sulfuric acid for a few minutes. On washing away the acid the surface presents a permanently matte surface. 5 claims. Claim 4: "An article of manufacture comprising a composition of a mineral material and still wax pitch having an external layer containing a substantial portion of pitch residue modified with sulfuric acid having a dull, matte surface."

CELLULOSE NITRATE EMULSIONS. Theodore Whittelsey, English Patent 233367.

A 3 percent amyl acetate solution of cellulose nitrate is mixed with a nonsolvent such as water, using sodium oleate or gelatine as an emulsifying agent.

CELLULOID BARETTE. George Knollman, German Patent 414927.

A previously cut rod of celluloid or similar material is seized by a U-shaped member of a special machine and bent around a suitable core, two reciprocating arms pressing the ends of the bent rod together, while another device perforates the superposed rod-ends and rivets the same together, forming an oval barette.

SOLUBILITY OF CAMPHOR IN WATER. H. Leo and E. Rimbach., Revue Generale des Matieres Plastiques, 1925, 1,259.

598 parts of pure water will dissolve one part of camphor, the solubility increasing with rise in temperature.

CELLULOID RECOVERY. H. T. Deizon and M. Br'at, French Patent 571312, Dec. 15, 1922.

Celluloid waste, especially if contaminated with cellulose debris such as cloth, etc., is treated with sulfuric acid of 1.5 specific gravity until the cellulose is gelatinized; the process then consisting of washing away the cellulose thus made soluble. The process is then repeated once more, the celluloid washed and dried.

RECENT BOOKS

PLASTICS AND MOLDED ELECTRICAL INSULATION.
By Emile Hemming, 1923. The Chemical Catalog Co., New York, N. Y.

Plastics, according to this author, comprise all of the substances which allow of shaping by means of molds and pressure, and for this reason includes such materials as ceramic products, calcareous cements and artificial stones, glass and road binders.

Chapters 1, 2, 3 and 5 deal with these materials. One of the interesting features of Hemming's book are the inclusion of a very large number of references to United States and foreign patents on the diverse products with which he deals.

Chapter 4 gives condensed account of the preparation of casein and the manufacture of plastic materials from the same, touching also upon the other uses of casein, such as glues, sizes and cold-water paints. Four pages of small print are devoted to patent references. The more modern casein plastics were as yet hardly known when this book was written, so are not included, the only reference to a commercial casein plastic being the well-known Galalith.

The chapter on road construction is very interesting, although it would hardly be of any direct value to the fabricator of molded products. However Mr. Hemming is to be commended for his breadth of view in including so many materials under the generic term of plastics. Nine pages of patent references to this phase of the art make this virtually a bibliography on road building. In addition there are also given twelve pages of sundry patent references on composition products that includes such widely divergent materials as cellulose ester plastics to water-resisting floor tile. Pulp and paper compositions, gelatinous and albuminous products, adhesives, cork, linoleum and floor coverings in general, compositions for phonograph records, vehicle tire fillers, artifical leather, artifical silk, paper, packing material, rubber and rubber compositions, rubber substitutes, cellulose, condensation products, and a general line of plastic compositions constitute the next thirty-five pages of patent references. These are given in abstract form, without comment.

One point that is particularly noticeable, however, is the fullness of detail given in the abstracts, which in most cases makes it unnecessary to look up the originals. It is much to be regretted, on the other hand, that Hemming failed to include these many patent references in his index, so that it becomes very difficult to locate a given reference a second time if one has lost the place. Without a doubt the book could be improved two hundred percent if a name, patent number and subject index covering the many excellent patent references had been included. Although this entails considerable labor, succeeding edi-

tions of the book might well include such an index as information is valuable in direct proportion to its ready availability.

This brings us to Book II of the work, which deals with the Use of Plastics for Molded Electrical Insulation. In this field the author is an unquestioned authority and the whole style of this section plainly shows that he is here dealing with a subiect that he is thoroughly familiar with. After a review of the state of the art of molded insulation twenty years ago, follows an excellent account of the molded insulation of today. Hemming classifies these materials as follows: Class A, Hot Molded Phenolformaldehyde products; Class B, Cold Molded Organic Insulation; Class C, Hot Molded Organic Compositions (shellac compositions); Class D. Inorganic Cold Molded Materials; Ceramics (Porcelain, Lava); Class F, Rubber Compounds; Class G, Organic Plastics (casein and cellulose compounds); Class H, Laminated Insulations.

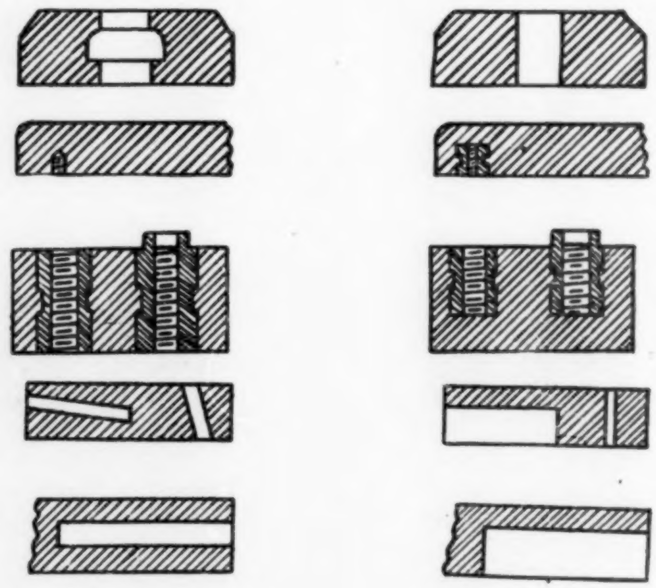
The raw materials, including the fillers as asbestos, mica, silica, cement and alkaline earths, magnesia, vegetable fibers, cotton flax, wood pulp, hemp, camphor, asphalts, pitch, shellac and other resins such as copal, dammar, rosin, cumarone resins, paraffin wax, linseed oil, other vegetable oils, mineral solvents, alcohols and organic solvents, caoutchouc and rubber, formaldehyde, phenol and the various insulating varnishes are accurately described in this chapter.

The third chapter of Book II comprises a detailed description of the various classifications of molded compositions already referred to. The fabricator of molded products will be most interested in Chapter four, which deals in great detail with the construction of molds and dies. This is illustrated with larger number of cuts and figures, showing plainly the correct and incorrect methods of forming dies. A considerable number of radio molded parts are illustrated and described, together with a discussion of the best types of material to use in making the same. The production of molded gears, laminated products and tubing are likewise taken up.

Chapter Four, Book II, is very complete resume of the properties and relative characteristics of molded products, including specification D-48-22 of the 1916 Standards Committee of the Molded and Formed Insulation Section of the Associated Manufacturers of Electrical Supplies, working in conjunction with the American Society of Testing Materials. A tabular review of the properties of the nine classifications of plastics materials is reproduced. Tests for tensile strength, compressive strength, tranverse strength, dielectric properties, distortion under heat and effects of moisture are described.

This is followed by a review of the patents on molded electrical insulation, which covers the last twenty pages of the book.

"Plastics and Molded Electrical Insulation" can be highly recommended to all workers in this field who are desirous of having authoritative information in a condensed form. The typography, presswork and binding leave nothing to be desired.



Sketches illustrating factors to be considered in designing mold parts. (From Hemming's "Plastics and Molded Electrical Insulation"—p 238.)

Where Is Your Suggestion?

Cellulose Plastics need better name, which should come from you

PERHAPS in no other field of human endeavor is habit so ingrained as regards nomenclature than in commercial and technical chemistry. In this domain names centuries old seem to almost dominate those who trade in and use the more common chemicals, and those who really should know better, but keep on calling the things by their obsolete and often grossly misleading name, despite the efforts of chemical societies and even international conventions to make them uniform and at least somewhat rational.

Some of the glaring examples, known possibly to many of the users of plastic materials, are: carbolic acid when phenol is meant; copperas (which an uninitiated person would surely think contained copper) is in reality iron sulfate; oil of vitriol for sulfuric acid; muriate of ammonia or even sal-ammoniac for ammonium chloride; oil of myrbane for nitrobenzene; "potash" for commercial sodium hydroxide which contains not one bit of potassium; and, of course from our point of view the most interesting, Pyroxylin for a plastic material consisting for the most part of cellulose nitrate and camphor.

Pyroxylin

Now the facts regarding the word Pyroxylin are well known to those who are familiar with chemistry and its history during the earlier half of the nineteenth century. Pyroxylin is the name given by the French chemist Pelouze to the nitrated product obtained when some form of cellulose is treated with a mixture of nitric and sulfuric acid. At first no distinction was made between the more highly nitrated celluloses, the "guncotton" and the lower nitrated celluloses, exemplified by cellulose dinitrate, and which during the fifties and sixties of the past century was universally called "collodion cotton."

Under this name, or sometimes even as simply "soluble cotton," thousands of pounds of this cellulose nitrate were used by photographers for making their "collodion emulsions" for photographic negatives, and by pharmacists for the preparation of the surgical dressing now popularly called "New-Skin" and the like, and which had originally been prepared by Schoenbein in Europe and perhaps even earlier by J. Parker Maynard in Boston.

Celloidine

In 1877 the name "Celloidine" was coined for a particularly soluble and clear cellulose nitrate that found its chief application for embedding anatomical specimens for microscopical examination. Gradually as time went on, the term pyroxylin began to be employed for that type of readily soluble cellulose nitrate which was most suitable for the manufacture of plastic materials.

From that point of view it is of course perfectly proper to speak of such plastic materials as "Pyroxylin Plastics," and the modern Celluloid, Zylonite, Fiberloid, Pyralin, Nixonoid, etc., are all such pyroxylin plastics. But here arises a new difficulty. There are also a large number of what might with perfect propriety be called "celluloid substitutes", among which are contained all the plastic materials made from the other cellulose esters, such as cellulose acetate, cellulose formate, cellulose butyrate, and the cellulose ethers such as ethyl cellulose and methyl cellulose.

(*Continued on page 67*)

How, Who, and Why

Answers to Queries from our Readers

Q. Can you give us any information as to whether there is on the market any molding material composed largely of sawdust used with an organic binder?

Ans. Several of the most popular forms of Bakelite hot-molding powders contain a large percentage of wood flour, which is much finer than ordinary sawdust. We know of no ready-prepared product containing coarser sawdust, users of such materials preferring to make their own mixtures. Sawdust can be used in conjunction with such binders as shellac, rosin, pitch or bituminite, usually together with some mineral filler in addition. Where time can be given for the material to set, some excellent products can be made from sawdust, kieselguhr and magnesium oxychloride (Sorel) cements. A well-known wall-decorating tile is made from such ingredients.

Q. We require a varnish for coating the inside of steel brine tanks which will not be attacked by sodium chloride solution of 20°Be. A coating that can be applied cold would give us the best satisfaction.

Ans. For a coating that must be applied cold, we would advise a special type of shellac varnish, of good heavy body, together with some moderating agent which will make it tougher. Such preparations can be secured all prepared for use at a price about four dollars per gallon. We are sending you the name of several concerns that can supply you.

Q. Can Pollopas be obtained in the United States and where?

Ans. To the best of our knowledge this material is still in the experimental stages and has not as yet been imported into the United States.

Where Is Your Suggestion?

(Continued from page 65)

Now obviously it would be a gross misrepresentation to call such materials celluloid, or even pyroxylin plastics, because they emphatically are not. If refuge is taken in giving of them their correct name, as cellulose nitrate plastic, cellulose acetate plastic, nomenclature is at once based on reason and becomes comprehensible—to those who know the subject and are conversant with chemistry, especially organic chemistry. We can see no objection whatever to this, and find that such a system is the natural way out of confusion.

However, the common man-of-the-street, the ultimate consumer of these materials does not know all this; and is not expected to know. The physical characteristics, such as appearance, feel, in many cases even color, of the common pyroxylin plastics is very much alike, and I doubt seriously if there is anyone who can tell the difference between, say, a piece of Du Ponts amber Pyralin or the amber Fiberloid made up in Indian Orchard.

The public has become accustomed to call these things simply celluloid. Trade directories, the public press and other lay publications have fallen into the same habit. Everything would be lovely were it not for the fact that Celluloid is a trade-mark!

So are most of the other names. Needless to say every manufacturer is jealous (in the correct sense of the word) of their own trade-name and wants to sell as much of his particular brand as possible. But still there is the urgent need for a single word that will convey to the user and consumer of this type of material the fact that it is one of those flexible, bendable, washable, waterproof, warp-proof, perfectly adaptable man-made products that has become indispensible for the fabrication of so very many household and toilet perequisites.

As already pointed out, the

Copies of Plastics

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artificial silk manufacturers, faced with an analogous situation, had the foresight and courage to merge their interests in the one word Rayon. It is only a few years ago and yet every department store, tailor and consumer knows what is meant by this material. Publicity did it. The rayon trade is reaching peaks that were undreamt of a few short years ago. At one stroke it made the material popular without the serious drawback of the, to American ears, anathematical word "imitation or artificial."

A great many suggestions have been made regarding such a generic term. We are now awaiting the outcome of discussions in the trade and hope to be able soon to publish a list of those suggestions that appear to be the most popular.

The name should be short, euphonious, unlike that of any trade-marked name already in use, and easily pronounced. We want still more suggestions. The publicity attending the rechristening of this material, and which will be given to the press at large, will do much to stimulate the sale and consumption of the celluloid type of material.

Public Confidence

Another point that is of some importance is that the public has a sort of lingering idea that "celluloid" is highly "explosive." Of course the trade knows this is not so, but nevertheless a new name which did not suffer from this tenaceously retained notion might help to overcome whatever prejudice against this useful material remains with the consumer.

The Manufacture of Artificial Pearls.

By Maurice de Keghel

See March Plastics

Fabrication of Combs

(Continued from page 53)

ed with emery, after which the teeth are shaped and pointed with a burr spindle with set of burrs by drawing them over the burrs beginning at the roots and ending at the points. The roots of the teeth may then be rounded out on a bottoming burring machine. This machine has a spindle on which one or more burrs revolve with their rounded edges protruding through the surface of the table of the machine.

The depth and distance back to which the base of the teeth can be rounded out can be regulated by an adjusting screw underneath and a gauge on the top of the table of the machine.

Hand tools called grailles are also used on high grade combs in shaping the coarse teeth, and hand bottoming saws for finishing out at the roots of the coarse teeth, but the processes of rubbing and polishing are considered sufficient for finishing the fine teeth at the other and of ordinary dressing combs.

———o———

Production Costs

The Moulded Products Company, 529 West 52 Street, is making a special study of production costs as related to selling price. Mr. J. Strongson, president of the firm, is collaborating with his production and sales manager, Mr. Vernon, to attain the most efficient basis possible.

The business of the company has been in a thriving, healthy state since its establishment fourteen months ago; yet Mr. Strongson is very much alive to the unlimited possibilities that a sound system of cost production and calculation of overhead overs to the manufacturer.

———o———

The well-known Bakelite "infinity" trade-mark has been extended to cover picture frames, chair-arms, drawer-pulls and knobs, by an application filed Oct. 12, 1925, Serial 221586.

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Was Hoover Describing You?

HOOVER SAYS U. S. TRAILS IN SCIENCE

Far Behind Europe in Advancing Fundamental Knowledge, He Tells Engineers Here

Secretary of Commerce Herbert Hoover yesterday lectured to the American Society of Mechanical Engineers here on the value of research in pure science.

It is all very well, he said, this glorifying of America in its progress in industrial science and the accompanying general industrial development, "unparalleled in history," but the backbone of this development, research in pure science, is weak.

"Instead of leading all other countries in the advancement of fundamental scientific knowledge," he declared, "the United States occupies a position far in the rear of the majority of European nations. A list of the awards of the Nobel prizes to men of various nationalities reveals the small proportion of first minds that we support."

—*New York World* Dec. 2, 1925

IF you, in this industry want to follow Mr. Hoover's advice, if you want knowledge leading to power, you must read **Plastics.**

This publication will keep you informed of all the scientific and practical developments in this fast growing industry.

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